## OUR BOOK SHELF.

*The Watkins Manual of (Photographic) Exposure and Development.* By Alfred Watkins. Pp. 124. (Hereford: The Watkins Meter Co.; London: George Houghton and Son, 1902.) Price 1*s.* net.

THE author is universally known among photographers as the inventor of the Watkins exposure meters and as having devised methods of exposure and development whereby the results are rendered more certain than by the older "rule of thumb" procedure. In this manual Mr. Watkins has systematically set forth his methods of timing exposure and development, and as these methods are sound in principle and useful in practice, a complete and orderly presentation of them as is here given results in a handbook that must be of great value to all serious students of the subject. It is the most welcome photographic manual that we have received for a long time.

We should have much preferred it if the author had remained true to his title and not endeavoured to provide a book suitable for two distinct purposes, namely, as an exposition of the procedures that he has introduced and popularised, and also as a guide for the beginner. Anyone who will be instructed by the statements that the lens forms the image and that the plate receives the "lens image," that a box of plates must be opened only in the dark room, and so on, will be quite unable to appreciate the bulk of the volume. Moreover, the author's heart is evidently in those sections of the subject that he has made peculiarly his own. In these he is full and clear, and probably no one, however much he may have studied the matter before, will read these parts without learning a good deal. The other chapters appear to have been written unwillingly, for in them accuracy is sacrificed for the sake of an apparent simplicity, and the subjects they represent cannot be said to be treated of, they are little more than referred to. In learning to photograph, as in learning to speak, the natural method is first to learn to do what it is desired to do, and finally to learn the grammar or the theory. No one tackles a subject in the opposite direction except under the compulsion of a schoolmaster, and then generally he learns the subject badly.

In dealing with chemical and physical changes, one must have a mechanical conception of the process, and Mr. Watkins is generally happy in his illustrations. But when he represents the course of development as a simultaneous reduction to the metallic state of all the particles of silver salt made amenable to the action of the developer by the exposure, so that as the image gradually grows in density these particles are at one stage each one-quarter reduced, later one-half, while finally the whole of each particle is completely reduced, he selects an illustration that is not true to fact. But this is a mere detail. We heartily commend the book to those who know how to photograph and wish to increase their knowledge and improve their practice. C. J.

*Nature Study and Life.* By C. F. Hodge. Pp. xv + 514; illustrated. (Boston, U.S.A., and London: Ginn and Co., 1902.) Price 7*s.*

THE author of this little volume is convinced that the only true method of nature-study is by making children thoroughly acquainted with living animals and their ways, both in the wild state and in confinement. He will have nothing to do with technicalities as to their structure and classification, leaving these, if they are ever to be taught at all, for older pupils. The keeping of tame animals as pets, and the history of domesticated animals, so far as known, are regarded as important factors in the scheme. A similar mode of study is pursued in the case of plants, where the pupil is not bothered with a long string of technical names or wearied with details as to their structure. Their life and their relations to inanimate surroundings are the only things it is sought to teach. The author's mode of procedure is to induce the members of the class to write down the names of all the animals—both wild and domesticated—with which they are acquainted, to classify them roughly, and then to discuss some of the more important types at length.

That the author's method is not a mere empirical suggestion, which may or may not prove successful in the class-room and in the field, is evident from the introduction to the volume by Prof. Stanley Hall, of Worcester, Mass., who writes as follows:—"New as his method essentially is, it is now made public only after years of careful trial in the public school grades in Worcester, until its success and effective working in detail is well assured. Thus it has passed the stage of experiment, and is so matured and approved that, with slight local adjustments, it can be applied almost anywhere for children of from six or seven to thirteen or fourteen years of age."

In the United States the success of the method seems indeed to be assured, and there is accordingly every inducement to give it a fair trial in this country. The book is brightly and pleasantly written and well illustrated. Whether the author is altogether correct in the statement on p. 8, that the mammoth was a third taller and more than twice the weight of "our elephant," and that "the mastodon" was larger still, we may be permitted to doubt. We are also at a loss to know the particular kind of fossil deer indicated by the name *Cervus americanus*, a title properly belonging to the existing Virginian white-tailed deer. R. L.

*Manual of Agricultural Chemistry.* By Herbert Ingle. Pp. 412. (London: Scott, Greenwood and Co., 1902.) Price 7*s.* 6*d.* net.

AGRICULTURAL chemistry deals with a very extensive range of subjects, including the whole of the materials and operations with which agriculture is concerned. The plant, the soil and the animal are each of them subjects sufficient to satisfy a whole generation of workers; but agricultural chemistry includes all these and much more besides. No book ever has been written, and none probably ever will be, attempting to deal with the entire subject; the student must, therefore, fill his shelves with a great variety of books, by many writers, if he would have at command the information available on the subjects of agricultural chemistry.

The present manual represents the course of instruction in agricultural chemistry given at the Yorkshire College, Leeds. The course of instruction is a full one, and the matter has been carefully written out by the lecturer, Mr. H. Ingle. The book thus produced will be heartily welcomed by all students of agricultural chemistry; it brings together clearly and correctly a great mass of facts which can be found in no other single volume. Especial attention is given to questions connected with pure chemistry, organic and inorganic, and with physiological and analytical chemistry; less prominence is given to the problems of practical agriculture. Thus we have the percentage composition of crops, but not the composition of average crops per acre; the subject of rotations is also omitted Again, under animal chemistry, we have no discussion of the relation of food to animal maintenance, or to the production of work or animal increase. The values of foods for the production of heat are given, but the extent to which these potential values are utilised for animal requirements is not discussed. The epoch-making researches of Kellner and Zuntz on this subject are not referred to.

The author describes Grandeau's method for the determination of humus in soil, based on the solubility of this substance in alkalis. As a good deal of work is being done with this method both in America and in this

country, it may be worth while noting that it does not show the total humus, but only the humic acids. Berthelot has, in fact, shown that even boiling with potash leaves a considerable part of the organic carbon and nitrogen of a soil undissolved.

English agricultural writers employ two names for *Beta vulgaris*—"mangel" and "mangold"; Mr. Ingle employs the latter. The former spelling is, however, more correct. The word comes from the German description "Mangel-Wurzel," or scarcity root, alluding to its resistance to drought. The spelling has probably drifted into mangold from the golden colour common to the roots. R. W.

*Ueber Aehnlichkeiten im Pflanzenreich.* By F. Hildebrand. Pp. iv + 66. (Leipzig: W. Engelmann, 1902.) Price 1*s.* 9*d.* net.

PROF. HILDEBRAND, in his introductory remarks, takes exception to the use of the term "mimicry." He states that it is applied by zoologists when two very different animals show similar appearances which are of apparent benefit to one, and that the explanation of zoologists infers that these similarities are developed in the struggle for existence. The latter part of this statement is distinctly misleading, as it is doubtful if any zoologists regard such similarities as being developmental. The object of the book is to show that in the plant world mimicry rarely if ever occurs, and that similarities in plants or plant forms are mainly due to environment or ecological factors. The series of comparative sketches which Prof. Hildebrand has published form light reading, but they might with advantage have been worked up in greater detail.

*Index to the Literature of the Spectroscope* (1887–1900, *both inclusive*). By Alfred Tuckermann. Pp. 373. Continuation of the previous index by the same author published in 1888. (Published by the Smithsonian Institution, 1902.)

IN the previous index, extending from the dawn of spectroscopy (or even earlier, for references are made to papers published in the seventeenth century) to 1886, the author arranged the books and papers under 320 different sections, placed alphabetically. In each section the titles of the papers, the authors' names, and references to the original papers and abstracts are arranged in the alphabetical order of the authors' names. The present contribution is divided into two parts, part i. being an authors' index extending to 188 pages, in which the authors' names are placed alphabetically and the full title, year of publication and references to the papers and abstracts are given; and part ii. a subject-index beginning with history, books, spectroscopy in general, followed by nearly 300 divisions arranged alphabetically. In these divisions the authors' names are first given alphabetically, followed by the references to the papers with the year of publication, but without any reference to the titles or to contents of the papers which are not given in the titles. Thus under titanium there are five references; the first is in the *Wiener Anzeiger*, and does not appear in the author-index, the second is on ultra-violet spark spectra, the third on titanium as a comparison spectrum, the fourth on the arc spectrum, and the fifth on the shifting of the arc spectrum lines under the influence of pressure. The value of the index would have been enormously increased if the papers had been arranged alphabetically according to the subjects, and with the papers on the same subject placed in order of date instead of according to the authors' names. Such a system would have entailed more printing, but it would not have caused very much more work in preparation and would certainly have been worth the additional trouble.

The list appears to be very complete; it may be said to be more than complete, for some of the papers indexed do not deal with spectroscopy. Thus five papers on meteors which we have examined do not contain any reference to spectra, and one on the yellow variety of arsenic does not deal with spectroscopy; several papers are indexed which contain only micrometric measurements of the diameters of planets. It is perhaps ungracious to criticise in this manner a work which must have been very arduous to the author, but the inclusion of papers that do not refer to the use of the spectroscope may be the cause of much loss of time and trouble to workers, and this would not have happened if the subject-index had been prepared in the way above suggested.

Dr. Tuckermann must be congratulated on the conclusion of his work, which, notwithstanding the defects which we have mentioned, cannot fail to be of service to many investigators in this important branch of science. H. M.

## LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

### Misuse of Coal.

NATURE of March 20, containing a most interesting communication by Prof. John Perry on the "Misuse of Coal," has reached me lately. Surely Prof. Perry takes an insular view of the matter. Like so many Englishmen, alas! he knows not the forest! The greater portion of the world cooks its food and makes itself comfortable on wood fuel, and though all the forests in the world would, according to European ideas, be inadequate to supply by their growth the present expenditure of coal (their fossilised remains), to overlook altogether the sun power which we can fix by growing wood fuel is surely, from even a European point of view, an oversight. Helmholtz compared the number of thermal units received by an acre of land in Germany during a year with the number of thermal units produced by burning the vegetable matter elaborated during a year. His calculation was that only the 1/1477th part of the sun's heat was thus rendered available.

On this basis it is possible roughly to calculate the maximum thermal efficiency as firewood of the wattle or Eucalyptus vegetation on the coast of Australia or South Africa. (Insolation is for the latitude somewhere about one-sixth greater at Cape Town than in mid-Germany; practically it is more on account of the clearer atmosphere.) The production of firewood is about five times as much; thus, taking Crottondorf as an example of a European forest giving one of the largest yields in timber, we have:—

Crottondorf spruce, mean yearly yield 143 cubic feet.
Quick-growing Eucalypts, S. Africa, do. 700 ,,

Or the maximum South African yield is five times the maximum European yield. But since the average weight of eucalypt wood is three times that of spruce, the heating power produced on an acre of Eucalypts must be set at about fifteen times that produced on an acre of northern and mid-European forest. Thus on the basis of Helmholtz's calculation a eucalypt plantation can, with the most favourable circumstances, in South Africa or on tropical mountains, store up, say, 15/1500 = 1 per cent. of the solar energy received on the unit of area.

The position in Cape Town to-day is that it is cheaper to plough the ground and plant a forest of quick-growing trees than to import coal from over the sea or by a long and expensive land journey. Firewood in Cape Town is worth nearly 1*s.* per cubic foot, and before the railway was extended to the diamond fields firewood there has fetched 1*d.* per lb., the price at which sugar has been retailed in England. No doubt from a British insular point of view coal at 2*l.* or 3*l.* per ton is a terrible misfortune. It certainly increases the cost of running machinery; but if this does not take place to a prohibitive extent, and if it makes the user of power careful not to waste it, it is not an unmixed evil. And if thereby afforesting is made a paying operation, it is at least open to discussion whether dear coal and good forests would not be better for England than an expenditure of 23,000,000*l.* sterling on